

TABLE 2.—Vapor pressures at pyrheliometric stations on days when solar radiation intensities were measured.

Washington, D. C.			Madison, Wis.			Lincoln, Nebr.		
Date.	S a. m.	S p. m.	Date.	S a. m.	S p. m.	Date.	S a. m.	S p. m.
1917.	mm.	mm.	1917.	mm.	mm.	1917.	mm.	mm.
Aug. 2	21.28	17.37	Aug. 1	16.79	10.21	Aug. 1	14.10	8.81
3	12.68	17.37	2	10.21	12.68	2	12.68	18.72
4	12.24	13.13	3	11.33	12.24	3	15.11	17.96
6	15.11	18.59	6	9.53	10.59	6	14.10	17.37
9	17.37	19.59	10	8.81	9.53	9	9.53	7.04
10	11.81	13.61	11	9.53	10.59	10	8.18	9.53
11	13.13	14.10	15	11.33	14.60	15	10.21	11.81
17	16.20	13.61	16	15.11	13.61	17	14.10	13.61
18	11.33	12.68	17	11.33	10.59	18	13.61	22.76
20	14.60	17.96	18	10.59	12.24	21	14.60	15.65
25	15.11	9.47	19	12.24	14.10	22	14.10	17.37
26	9.53	11.33	20	14.10	16.20	23	9.53	7.57
27	10.21	12.24	25	7.04	10.21	24	7.04	8.18
28	12.24	15.11	29	9.14	8.18	25	8.18	10.59
			30	9.14	8.81	30	8.18	8.18
			31	9.47	8.48	31	10.21	13.13

TABLE 3.—Daily totals and departures of solar and sky radiation during August, 1917.

(Gram-calories per square centimeter of horizontal surface.)

Day of month.	Daily totals.		Departure from normal.		Excess or deficiency since first of month.	
	Wash- ington.	Madison.	Wash- ington.	Madison.	Wash- ington.	Madison.
1917.	calories.	calories.	calories.	calories.	calories.	calories.
Aug. 1	307	502	-179	24	-179	24
2	458	299	2	-176	-176	-152
3	533	507	52	124	-125	-28
4	611	535	132	65	7	37
5	614	499	138	31	145	68
6	560	529	86	64	231	132
7	415	272	-57	-191	174	-59
8	401	355	-68	-105	106	-164
9	550	402	63	-56	159	-220
10	609	637	144	182	303	-38
11	539	539	77	96	380	48
12	507	85	47	-365	427	-317
13	511	374	63	-74	430	-391
14	440	540	-15	95	465	-296
15	320	583	-133	140	332	-156
16	343	553	-108	112	224	-44
17	523	595	85	157	309	113
18	609	582	163	127	472	240
19	553	370	110	-62	582	178
20	531	546	90	116	672	294
Decade departure					+369	+332
21	515	303	77	-124	749	170
22	299	432	-137	8	612	178
23	128	423	-305	7	307	185
24	411	193	-20	-225	287	-40
25	316	607	-28	192	375	152
26	554	554	158	142	533	224
27	570	161	156	-248	689	46
28	568	568	147	152	836	198
29	435	560	17	157	833	355
30	249	529	-167	129	686	484
31	102	540	-312	143	374	627
Decade departure					-298	+333
Excess or deficiency (gram-cal. since first of year. (per cent.)					-4,540	+1,373
					-4.7	+1.4

AURORA OF AUGUST 21, 1917.

(Approved by Division of Aerological Investigations.)

Mr. Douglas F. Manning, Alexandria Bay, N. Y., contributes the following note of an aurora observed August 21, 1917:

On August 21, 1917, between the hours of 8 p. m. and midnight, and how much later I do not know, an aurora occurred of no particular brightness or well-defined formation, but of intense activity and at apparently a much lower altitude than any other display I have ever witnessed. The nearest description that could be given it would be to say that a display of sheet lightning was taking place without clouds, so tremendous was the speed of the yellow-greenish flashes of light that had their origin about 20° above the northern horizon, extending to about 5° south of the zenith whence they died out.

The sky was crystal clear, with a cool, brisk north wind blowing, and I regret that there were no clouds present so that I could [have formed] an estimation of the altitude of this aurora. The illusion of their

presence in about the region occupied by the strato-cumulus was perfect; not only that, but the tremendous speed of the flashes with the ill-defined formation all seem to prove that this aurora occurred at no very great height.

AURORA OF AUGUST 25, 1917, AT WASHINGTON, D. C.

American University (Massachusetts and Nebraska Avenues).—A brilliant display of the aurora borealis was observed at the American University from about 9 to 10 p. m. on August 25. When first observed (8:50 p. m.) it had the appearance of a bank of haze through which the beams of a searchlight might be shooting. It was soon apparent, however, that the display was an electrical one as streamers began shooting upward in rapid succession.

When at its maximum an arch 60° in length, 15° in height, 5° in width, was centered about the magnetic north the ends disappearing in a low bank of haze on the horizon. From this arch shooting upward were beautiful streamers of red and white. At about 9 p. m. (75th mer. time) a patch of brilliant red appeared about 15° east of north and directly above the arch. While similar patches were visible at the same and other points during the evening, this one far exceeded in brilliancy any of the others, appearing as a sky might from reflection of an intense fire.

At 9:10 p. m. a brilliant patch appeared directly above the lower left end of the arch. This had the form of a cirrus cloud, but was brilliantly colored with blue.

About 9:15 p. m. to 9:20 p. m. the streamers became varied in color, the white and red predominating. At 9:20 p. m. a secondary arch appeared about 5° above the first one, having the same distinct blue color of the lower arch.

The phenomenon ended shortly before 10 p. m.—*Irving F. Hand.*

Otterbourne, Chevy Chase (Connecticut Avenue and Percy Street).—Saturday night August 25, 1917, between 9:25 and 9:40 p. m. (75th meridian time), the undersigned observed from the point indicated in the margin, a characteristic auroral arch without any streamers. The arch was complete, about 10° high at its summit and had a horizontal extent of about 40° on the northern horizon. The summit seemed to be under Polaris. The light of the arch was a steady, pearly luminescence with a very slight suggestion of green. No dancing or pulsation was observed, although looked for. At about 9:30 there was, for a few seconds, a suggestion of a second and higher arch—or segment of one—forming about 1° above the center of the complete arch. Earlier and later observations could not be made owing to unfavorable location.—*C. Abbe, jr.*

551.593 (729.2)

PARHELIA 90° FROM THE SUN SEEN IN JAMAICA.¹

By MAXWELL HALL.

[Montego Bay, Jamaica, May 1, 1917.]

On April 10, 1917, at about 8:40 a. m., local time, when the sun's altitude was about 40°, a most unusual phenomenon was seen by the Rev. G. E. Henderson and members of his family near Browns Town, namely, the parhelia or mock suns due to the intersection of the halo ring of 90° radius with the mock sun plane or ring parallel to the horizon.

Parhelia due to the intersection of the halo ring of 22° radius with the parhelic plane or ring are quite common; in the morning a sheet of thin cirro-stratus will often be

¹ Reprinted from Jamaica Weather Report No. 469, p. 5, on recommendation of Division of Aerological Investigations.

seen in Jamaica to produce that halo, and as often as not the halo is cut by the parhelic ring, producing two bright patches showing colored light on either side of the sun.

Parhelia may also be similarly formed with the halo ring of 46° ; but parhelia formed with the halo ring of 90° have been seen only on a few occasions since the year 1663 when Hevelius, the astronomer, saw the phenomenon at Danzig; his drawing is reproduced in the Observer's Handbook, issued by the Meteorological Office, London.

Loomis in his Treatise on Meteorology, published in 1885, says that only three observations of this halo are on record, and that its exact dimensions have not been well determined.

No attempt was made on April 10 to measure anything, but there can be no doubt that the mock suns due to this halo and the parhelic ring were seen. Mr. Henderson wrote the same day to the Daily Gleaner, and to me on the 16th, and a few letters have been exchanged to settle the facts.

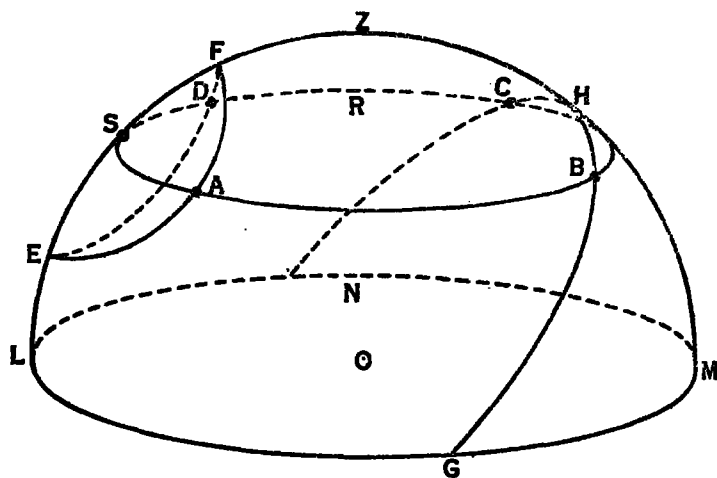


FIG. 1.—Perspective view of optical phenomenon at Browns Town, Jamaica, April 10, 1917.

At Browns Town there was much thin cirro-stratus about, indeed the sky seems to have been covered with it except to the north: the sun shone through it surrounded by a coronal ring of about 10° radius, and by the halo ring of 22° radius, both showing prismatic colors; the mock suns on either side of the sun, and at the same altitude as the sun, were almost of the same size and brilliancy as the sun itself.

As the sun was then nearly above the eastern point of the horizon, one of these mock-suns was about ENE. and the other ESE; the latter had a broad band of light extending about 10° along the parhelic ring, and away from the sun.

Following on round the horizon there was another mock sun in the SW and another in the NW, but these were both much fainter than the two towards the east. They were all about the same altitude above the horizon.

This unusual display lasted about half an hour, when a heavy cumulus cloud blotted it out.

In figure 1 *O* is the place of the observer and *LGMN* his horizontal plane; *S* is the sun, *EAFD* the halo ring of 22° radius and *GBHC* the halo ring of 90° radius; and *SABCD* the parhelic or mock-sun ring; *A* and *D* are the two bright mock suns toward the east, and *B* and *C* are the two faint mock suns toward the west.

Now the latitude of the place is $18^\circ 24' N$, the declination of the sun was $7^\circ 52' N$, and the hour angle was about 50° ; hence the azimuth of the sun was 85° from *N*

toward *E*, the azimuth of *B* was 50° from *N* toward *W*, and the azimuth of *C* was 40° from *S* toward *W*; the latter azimuths agreeing with the observed positions NW and SW as nearly as could have been expected.

MAGNETIC STORM OF AUGUST 26-27, 1916.¹

By W. E. W. JACKSON.

[Reprinted from Science Abstracts, Sect. A, June 25, 1917, §553.]

An analysis is made of the magnetic records at Sitka, Meanook, Agincourt, Cheltenham, Tucson, and Honolulu during the occurrence of the aurora and magnetic storm of August 26-27, 1916.

The beginning of the disturbance was very abrupt in *H* and *D* at all the stations, and from later comparisons with the records at Eskdalemuir it is evident that the effect occurred practically simultaneously all the world over. —*C. P. B[uller]*.

The Weather Bureau report on the aurora borealis of August 26-27, 1916, was published in this REVIEW, August, 1916, 44:440 and following.—*C. A. jr.*

551.508.2 (048)

COMPARISON OF CALLNDAR SUNSHINE RECORDER AND ÅNGSTRÖM PYRHELIOMETER.²

By J. PATTERSON.

[Reprinted from Science Abstracts, Sect. A, July 30, 1917, §584.]

Comparative readings were taken with (a) a normal Ångström pyrheliometer, (b) a similar instrument having the receiver covered with a glass bulb of the type used in the Callendar, and (c) a Callendar recorder. The results from one day's readings are shown graphically. These are typical of all days. The normal Ångström gives the highest readings. The shielded Ångström gives about 10 per cent lower throughout most of the day, but toward sunset this percentage error decreases. The Callendar recorder gives close agreement with the shielded Ångström in the morning, but during the afternoon the readings increase relatively and toward evening exceed those of the normal Ångström. In these experiments the Callendar was mounted normal to the incident sunlight and shielded from sky radiation. The comparisons which have been made with the Callendar show the desirability of standardizing its readings by laboratory investigation.—*J. S. Di[nnes]*.

NOTE BY PROF. H. H. KIMBALL.

In connection with the observed afternoon excess of the shielded Ångström over the normal Ångström, one is reminded of Prof. Kimball's experience³ to the effect that the Callendar instrument deprived of its glass screen read higher when the sun was low than when it was high. Further that the glass-screened Callendar read higher with a high morning sun than with a high afternoon sun.

Experiments also showed (loc. cit. Table 3) that with diminished intensity of solar radiation—artificially secured by means of a whirling sectored screen—the ratio of the Callendar instrument to the Marvin, increased.

All these experiences are in harmony with Patterson's results.

¹ Jour. Roy. Astron. Soc. Canada, Toronto, January, 1917, 11:17-22.

² Trans. Roy. Soc. Canada, Sept. 1916, 10:51-55.

³ Kimball, H. H., in this REVIEW, August, 1914, 42:475.